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Is There a Need for a Federal Marketing Order in Hops?*

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Introduction

The hop plant is a perennial that requires a substantial capital investment to establish a hop yard. Hops are marketed under multiple year contracts at fixed prices which also makes hops unique from most other agricultural products. The sum of establishment and first year costs per acre that are required before a mature hop yard is in full production are: 1) \$7,732 for aroma hops; 2) \$7,773 for alpha hops; and 3) \$8,063 for super alpha hops based upon 1999 input costs (1). Producers are reluctant to make such large capital investments unless there is some expectation of a reasonable and stable market demand and profits for the product. In the past, this stability has been demonstrated by the percent of hops sold or contracted ahead. This percentage has been slowly declining (7). Without the use of some type of marketing tools, including a marketing order, the U.S. hop industry will continue to face a state of chaos.

A major indicator of this chaotic state has been the decreasing number of hop producers and dealers. Towards the end of the last hop marketing order in the mid-1980's there were 211 base holders or producers. Today, without a federal marketing order the number of producers has declined to about 70. In relation to the number of buyers or dealers in hops, the number has decreased from nine in 1986 to only four in 2003 with one of those four being a grower cooperative. Thus, while there has been increasing concentration on the hop growers on the supply side of the market, there has been even further concentration in the number of dealers on the demand side of the market. These trends suggest that there has been increasing market power on the demand side of the market relative to the supply side with producers losing market power. Such an imbalance in market power is not a desirable economic situation. A federal

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marketing order would provide the opportunity for growers to regain some of their market power. The countervailing market power that a federal marketing order with a producer allotment provision would provide will help bring stability to the U.S. hop industry.

The U.S. hop industry seeks to lessen the chaotic state and instability that it currently finds itself in through a federal marketing order. It is anticipated that the federal marketing order will:

1. Achieve greater stability of hop farm income;
2. Increase hop prices in the long run;
3. Transfer some market power and decision making from hop dealers to hop growers, i.e., greater participation in the marketing process by hop growers; and
4. Generate market information and research contributing to improved market understanding and decision making by U.S. hop growers.

Why a Federal Marketing Order?

One of the primary objectives of a Federal Marketing Order is the creation of an orderly marketing system, which according to Kohls and Uhl (2, p. 540) is "... the coordination of the total supply of a commodity over time, form, and spatial markets, in such a way as to achieve some market objectives."

The U.S. hop industry is in need of an orderly marketing program since the structural supply and demand for U.S. hops is inelastic with respect to price. The inelasticity results in wide price savings with very small changes in the quantity supplied or demanded.

The inelasticity of the supply and demand for U.S. hops is fully documented in the classic study by Habuki (3). Habuki (3, p. 146) found that "... the elasticity of the spot market price with respect to the total U.S. hop production is -3.3382. This implies that a 1% increase in the

total hop production will decrease the market price by almost 3.34%, *ceteris paribus*.” These research results indicate an inelastic demand with respect to price in the short run for U.S. hops.

Habuki (3, p. 121) estimates that the short run supply elasticities with respect to price are 0.0500, 0.0549, and 0.0526 with respect to prices lagged 1, 2, and 3 years respectively. Habuki (3, p. 121) estimates the long run supply elasticities to be 0.05579, 0.0613, and 0.0587 with respect to prices lagged 1, 2, and 3 years respectively. These results indicate an inelastic supply for U.S. hops.

The above results are in direct contradiction to the report filed to the USDA in a letter from Mark Jekanonski of Sparks Companies, Inc. to Charles W. Parrot, Associate Deputy Administrator of USDA/AMS. In that report, they (Sparks) conclude that the demand with respect to price for alpha acid is elastic, i.e., reduce the quantity and the total revenue will decrease. The Sparks model is a complete over simplification of the supply and demand structures in the U.S. hop industry and has serious statistical problems. In relation to the economic simplicity of the model, such single equation models estimated with ordinary least-squares will almost always result in calculated elasticities of demand with respect to price that are more elastic than models that contain several equations involving simultaneous relationships which are more reasonable representations of actual market conditions. An example of the latter is the work by Habuki (3).

The Sparks model suffers from serious statistical problems, including insignificant explanatory variables and serial or autocorrelation. First, one explanatory variable (Log of Beer Production) is not statistically significant and should be dropped from the model. If this variable is dropped from the model the adjusted coefficient of determination is increased marginally, but the serious problem of autocorrelation or serial correlation still remains. The Durbin-Watson

(DW) statistic used to test for autocorrelation with the original Sparks model is 0.55 and is 0.48 with the deleted variable. The DW statistic indicates that the single equation model has positive autocorrelation resulting from a specification error and/or the wrong functional form (linear) was used. A good researcher would not place any degree of confidence in such research results. Autocorrelation leads to downward biased standard errors and thus to incorrect statistical tests and confidence intervals. However, the Sparks report goes on to use the model to indicate that the demand for U.S. hops is elastic. This conclusion is based upon an unacceptable statistical model. Further, the Sparks report fails to acknowledge that the price flexibility coefficient only sets a lower limit of the price elasticity of demand (Tomek and Robinson, pp. 49-50) (4). As indicated by Tomek and Robinson, if there are no cross effects or substitutes for a product then the reciprocal of the price flexibility is a good approximation of the elasticity. If significant cross effects exist the reciprocal of the price flexibility is less than the demand elasticity. In the case of U.S. hops or alpha acid there exists a near perfect substitute in the form of the same product(s) from Germany and other hop producing countries. The Sparks model is not acceptable statistically or economically. Given the sophistication of the Habuki (3) model and its inclusion of the supply and demand of hops from Germany, it must be concluded that the demand for U.S. hops is inelastic.

To illustrate the dynamic nature of the U.S. hop market the price of alpha and alpha acid production as taken from the Sparks report is graphed in Figure 1. Inspection of the scatter plot (Figure 1) where each point represents the intersection of a supply and demand curve on an annual basis reveals a definite pattern. The years 1977-1979, 1980-1985, 1986-1990, and 1991-2001, fall into four distinct clusters. The clusters with contiguous years within each cluster demonstrate the shifting of the demand and supply curves for U.S. hops over time. Within each

cluster the demand curve has been more stable than the supply curve. The single equation model developed by Sparks failed to account for these major shifts in demand. Therefore, the specification error indicated by the positive autocorrelation is expected given the simple nature of the model.

If one were to fit a single equation to the data set the shifts in the demand function must be accounted for by binary variables to change the intercept value for each time period defined by the clusters. A model fit to the Sparks data set with the addition of binary variables to account for the shifts resulted in the following:

$$\ln \alpha = 379.314 - 0.71456 \ln \text{realpri} - 48.4831 \ln \text{year} \\ - 0.76290 D1 - 0.45411 D2 - 0.16741 D3$$

(1.95)
(-2.07)
(1.90)
(-5.09)
(-5.74)
(-1.19)

where: $\ln \alpha$ = logarithm of alpha acid production (1,000 lbs);

$\ln \text{realpri}$ = logarithm of the real price of alpha (\$/lb);

$\ln \text{year}$ = logarithm of years acting as a trend (1977, 1978, ..., 2001);

$D1 = 1$ 1977-1979 and zero otherwise;

$D2 = 1$ 1986-1990 and zero otherwise; and

$D3 = 1$ 1980-1985 and zero otherwise.

The coefficients were estimated with ordinary least-squares and the Student's t-values are shown below each coefficient. The R^2 for the equation is 0.8992 while that for the Sparks model was only 0.5283. The Durbin-Watson statistic is 1.6272 and is inconclusive in testing for positive autocorrelation. This equation is much better and more acceptable than the Sparks model which had a positive autocorrelation problem.

Given that the model reported above is a double logarithm function form and the quantity variable is on the left hand side, the coefficient -0.71456 is the direct price elasticity. This result

indicates that the demand for U.S. hops is inelastic. These results are in agreement with those of Habuki (3).

In addition to the wrong conclusion drawn in the Sparks report about the elasticity of demand for U.S. hops, the report repeats numerous times that the purpose for the hop marketing order with a producer allotment provision is to maximize total revenues to hop growers. Past history of the U.S. hop industry and its constituents strongly suggest that such a behavior pattern would not exist. An empirical analysis of the behavior of the Hop Administration Committee (HAC) under Federal Order No. 991 was conducted to determine if the HAC restricted the flow of hops to the market. The comparison was HAC's projected components of supply and demand to actual market results. In published and reviewed research concerning the behavior of the HAC under the federal marketing order concluded that: "The analysis revealed that on the average, the committee overestimated demand components and underestimated supply components. The HAC can best be described as being overly optimistic in their decision process (projections), and placing on the market a larger quantity than needed if they had perfect knowledge and were able to project all supply and demand components with complete accuracy. As a result, it can be partially concluded that the HAC did not unduly use its market power in restricting the quantity of hops available to the market from domestic production. The actions of the HAC appear to have developed an orderly marketing program for hops. The degree of price variability during the life of the present order has been less than half that experienced otherwise." (Folwell, 5 and 6, p. 16).

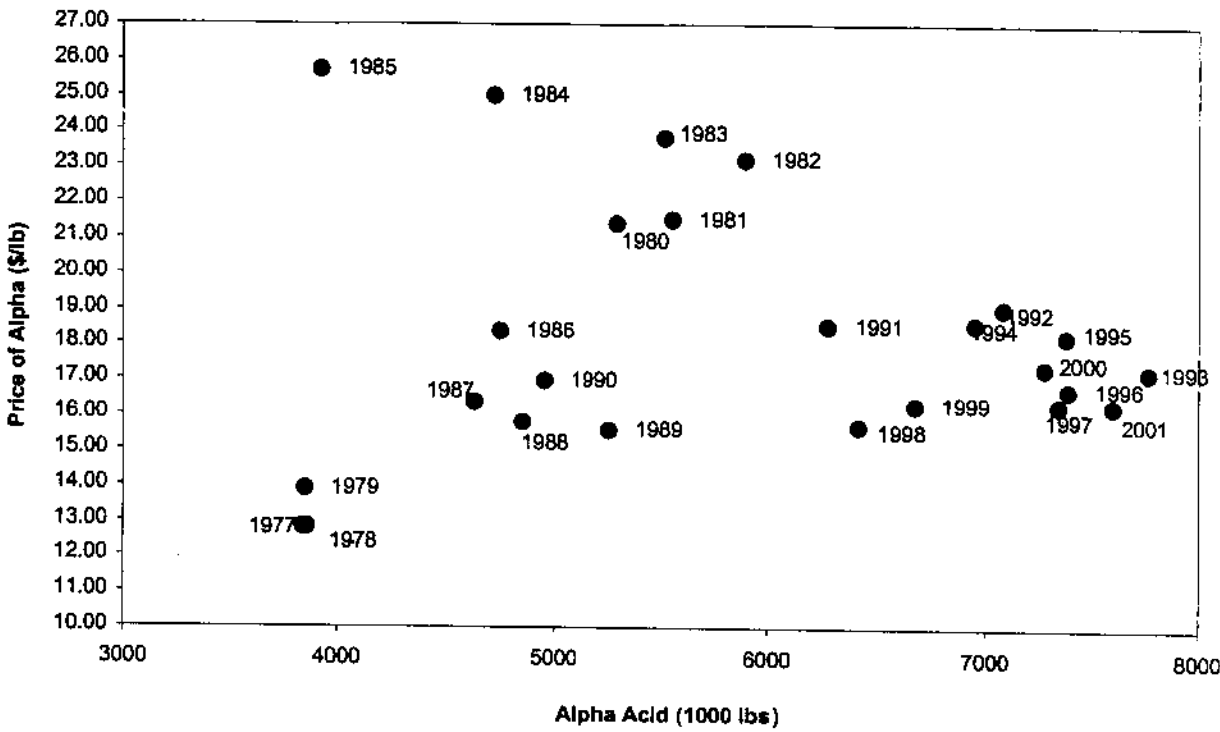
As a final indicator of the stability a federal marketing order can bring to the U.S. hop industry, the historical price and production data for U.S. hops from 1965 through 2002 are presented in Appendix Table A1. The price data from 1966 through 1985 when Marketing Order

991 was in effect indicates that the average price of hops increased or remained stable in a fairly regular pattern indicating an orderly marketing situation. Starting in 1986 to the present after the order was terminated, the average price of hops has increased and decreased in a rollercoaster pattern. Such price swings are not indicative of an orderly marketing situation and often leads to a misallocation of resources.

A final document to support a marketing order for U.S. hops is a letter to the USDA which I wrote in 1981 (Appendix B). This letter supported the concept of the existing federal order and predicted the consequences of the order termination. All of my predications came true. In addition, I gave an estimate of the impact that the last federal order had on the price of beer and malted beverages in the U.S. It was so diminutive that a consumer would not know that a federal marketing order was successful in creating an orderly marketing situation.

Overall, I fully support the implementation of a federal marketing order with a producer allotment program for the U.S. hop industry. The industry currently faces an inelastic demand and supply with resulting wide price variations. It has been demonstrated in the past that they (U.S. Hop producers) do not unduly restrict the flow of hops to the market when allowed to have some market power through a producer allotment provision in a federal marketing order. U.S. hop producers are in need of such a marketing tool and the countervailing power it can create for the producer side of the market. If the U.S. hop producers are not allowed to use such a marketing tool, the industry will continue to shrink in size and will someday become extinct.

Figure 1. US Alpha Acid Price and Production (1977-2001)



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APPENDIX A

Historical Prices and Production of U.S. Hops

Appendix Table A1. Historical Price Production Data for U.S. Hops, 1965-2002

Year	Price (\$/lb)	Production (1,000 lbs)
2002	1.94	58,336
2001	1.91	66,832
2000	1.87	67,576
1999	1.69	64,555
1998	1.69	59,548
1997	1.60	74,822
1996	1.65	74,970
1995	1.71	78,852
1994	1.81	74,560
1993	1.76	76,144
1992	1.74	74,337
1991	1.68	69,155
1990	1.48	56,855
1989	1.38	59,326
1988	1.40	54,696
1987	1.51	50,048
1986	1.78	49,018
1985	2.03	49,713
1984	2.10	56,167
1983	1.93	68,111
1982	1.74	78,558
1981	1.51	79,144
1980	1.50	75,560
1979	0.98	54,929
1978	0.90	55,071
1977	0.90	54,777
1976	0.85	57,774
1975	0.83	55,913
1974	0.80	56,929
1973	0.76	54,769
1972	0.71	51,309
1971	0.66	49,663
1970	0.56	45,863
1969	0.51	41,763
1968	0.47	43,733
1967	0.46	49,498
1966	0.45	55,418
1965	0.46	56,060

APPENDIX B

USDA Letter Supporting Federal Marketing Order No. 991

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99164

DEPARTMENT OF AGRICULTURAL ECONOMICS

July 23, 1981

Dr. Richard Heifner
U.S. Department of Agriculture
Agriculture Marketing Service
Room 3063 South Building
14th St. & Independence Ave.
Washington, D.C. 20250

Dear Dr. Heifner:

Please find enclosed five copies of the manuscript entitled "The U.S. Hop Industry and the Volume Control Provision of the U.S. Federal Hop Marketing Order." This manuscript was the basis of my statements before your fellow review team members Drs. Ambruster and Nelson, on July 22, 1981 in Yakima, Washington. Please distribute the extra copies among your fellow review team members so that they might have an opportunity to review its results and implications before you submit your team report.

The comments in this letter, as well as the manuscript enclosed were generated as a result of my being a public consultant to the federal hop marketing order. The research as reported in the manuscript was undertaken without the knowledge of the hop administrative committee. I initiated the research in order to develop background information for myself in the role as public consultant to the marketing order.

I indicated to your fellow review team members in Yakima that I believe the federal hop marketing order has achieved its objectives under the 1937 enabling legislation. The order has brought about stability in terms of production, price, and incomes to U.S. Hop producers. Further, I stated that the hop administrative committee has always been over-optimistic in terms of its demand projections and under-optimistic in terms of competing supplies in determining the salable percentage for each marketing year. Thus, the HAC has made available to the market more hops than necessary if the HAC had perfect foresight as to the market. Such projections have led to a quantity which can not be labeled as restrictive in terms of the quantity made available.

I further gave evidence that the maximum price enhancement that could occur in terms of consumer prices is less than \$0.000085 per 12 oz. bottle of beer given the value that was placed upon the annual use of the producer allotments in 1980, the seasonal average price, and the current hopping ratio. This estimate of price enhancement is the maximum that could occur and I believe overall it has been substantially less than the above estimate.

The marketing system is more stable in terms of having a reliable supply as a result of the order. Facing less risk, the cost of marketing hops have been less, which aids in the overall efficiency of the hop industry.

In discussing the marketing order with Drs. Ambruster and Nelson, I

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suggested a scenario that given the characteristics of the industry in terms of its income variability, investment costs, and quick production response to price signals in the marketplace, that without the federal marketing order there would be fewer hop producers in the U.S. and would more likely be of a corporate nature.

Overall, the order has not had a negative impact upon consumer prices of any significance and has led to a more efficient use of resources and price stability. The consumer as well as the producer has benefited from the provisions utilized under the hop marketing order.

If you should have any questions concerning the contents of the manuscript or the comments made in this letter, please feel free to contact me.

Sincerely,

Raymond J. Folwell
Professor

Enclosure
cc: Robert Eaton ✓
Peter Rooney ✓

RJF/vs